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Operating Instructions

Elmasonic X-tra 250 / 550 / 800 / 1200 / 1600

Ultrasonic Cleaning Units

• english •

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1 General

The present Operating Instructions are part of the delivered equipment. They must be ready for use at any time and remain with the unit in case of resale.

Carefully read the Operating Instructions before use of the unit and operate the electric appliance according to the instructions.

We reserve the right to carry out technical modifications on the unit due to advanced development.

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2 Important safety warnings

Read before initial operation!

Intended use

The present Elma ultrasonic cleaning unit has been designed for the treatment of **items** and **liquids** only.

Do not clean any living beings or plants!

User

The unit must be operated by instructed personnel. Do not let children operate the unit.

Mains connection

For safety reasons, the present unit must be connected to a correctly grounded socket only. The technical details indicated on the nameplate must correspond with the available mains connection details, in particular those of the mains voltage and current connected value.

Prevention of electrical accidents

For purposes of maintenance and care of the unit, in case of suspected humidity inside the unit or in case of malfunctions and after operation pull the mains plug.

The unit must be opened by authorized specialized personnel only!

Cleaning liquid

Risk of fire and explosion! Do not use flammable liquids directly in the cleaning bath.

Hot surfaces and liquid

Risk of burning and scalding! Depending on the duration of operation, the surface of the unit, the cleaning liquid, the basket and the cleaned items can heat up considerably.

Noise emission

Ultrasonic units can produce annoying sounds.

Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover. This is particularly recommendable for 25 kHz operation without cover.

Sound transmission through physical contact

Do not reach inside the cleaning liquid or touch sound-carrying parts (tank, basket, cleaning items, etc.) during operation.

Exclusion of liability

The manufacturer cannot be held liable for damages on persons, equipment or cleaning items caused by improper use. The operator is responsible for the instruction of the operating personnel.

3 The ultrasonic cleaning process

Today, cleaning by ultrasound is the most modern fine cleaning method.
The electric high-frequency energy created by an ultrasonic generator is transformed into mechanical energy by piezo-electrical transducer systems and is then transmitted into the bath.
This process creates millions of tiny vacuum bubbles, which implode due to the variations of pressure caused by the ultrasonic activity. Highly energetic liquid jets are created. These jets remove dirt particles from surfaces and even from the smallest grooves and bores.

3.1 Ultrasonic cleaning factors

Basically, the cleaning result depends on four factors:

1. Physical energy

Ultrasonic energy is probably the most important mechanic factor in the cleaning process. This energy must be transmitted through a liquid medium to the surfaces which are to be cleaned.
The Elmasonic X-tra units are fitted with the innovative sweep technology: the zones of low performance in the ultrasonic bath are reduced through electronic oscillation of the sound field (sweeping).

2. Cleaning media

For saponification and removal of the dirt particles a suitable cleaning chemical is required. Elma has a large range of cleaning media on offer.

Cleaning chemicals are also necessary to reduce the surface tension of the liquid. This increases the efficiency of the ultrasonic activity considerably.

3. Temperature

The effect of the cleaning medium is improved by the optimum temperature of the cleaning liquid.

4. Cleaning period

The cleaning period depends on the degree and the kind of contamination, on the cleaning chemical, the temperature and on the stage of the cleaning process.

Pre-cleaning (if required)

For heavily contaminated items we recommend to pre-clean them with a steam jet cleaner. This will prolong the service period of the cleaning liquid and increase the throughput of cleaning items considerably.

Elma offers a modular product range of Elmasteam steam jet cleaners (please contact your supplier).

4 Product description

4.1 Elmasonic X-tra product features

Elmasonic X-tra – state-of-the-art technology Made in Germany!

- transducer tank made of cavitation-proof stainless steel with 3-year longterm warranty
- two ultrasonic frequencies in one unit, one for intensive cleaning, and the other one for gentle cleaning
- Sweep function for a continuous shifting of the sound pressure maxima; guarantees a homogeneous sound field distribution in the bath
- Degas function for the efficient degassing of the cleaning liquid
- stepless power regulation between 10 and 100 %; individual adjustment of ultrasonic power to degree of contamination and surface material of cleaning item
- quick drain duct with welded piping
- splashwater-proof operating panel
- all electric connections on the unit designed as removable plugs
- SPC interface
- optional expansion available: oscillation, central control, remote control, oil separation, filter-pump aggregate

4.2 CE conformity

The present Elma ultrasonic unit is in compliance with the CE marking criteria according to the EMC directive 89/336/EEC and the low voltage directive 73/23/EWG.

The declaration of conformity is available from the manufacturer.

4.3 Delivered equipment

- Ultrasonic cleaning unit
- Operating Instructions

4.4 Description and function of operating elements

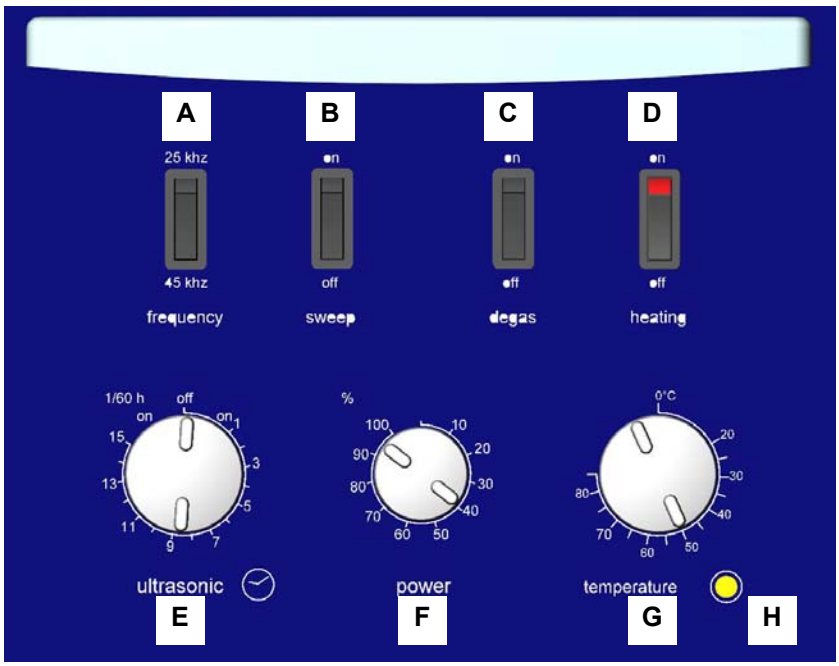

Illustration 3.1 View operating elements

A **Frequency switch-over** for the adjustment of the frequency to depending on the degree of contamination and the surface material of the cleaning items.

B **Sweep switch** for the optimum sound field distribution in the cleaning liquid.

C **Degas switch** for the efficient degassing, particularly of freshly mixed cleaning liquids.

D **Heating switch** for the optional additional switch-on of the heating if required in case of heavy contamination of the cleaning items.

E **Timer for ultrasonic operation**. Setting options:
1-15 min for short-term operation (with automatic switch-off)
Permanent position ∞ (manual switch-off required).

F **Power control ultrasound** for the adjustment of the ultrasonic intensity to the degree of contamination and the surface material of the cleaning items.

G **Control for heating thermostat** setting range 20 – 80°C.

H **Heating pilot lamp** indicates heating operation.

4.5 Description unit connection sockets

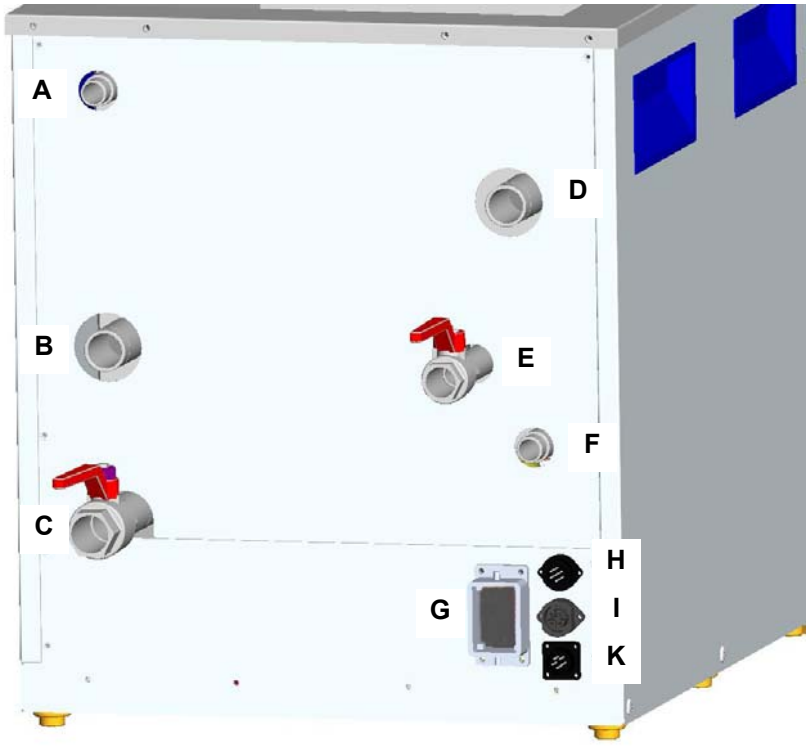

Illustration 3.2 View connection sockets on the unit back

A **Supply surface skimming**.

B **Supply cascade piping** for modular cleaning lines.

C **2-way ball valve** for draining the tank.

D **Overflow duct** e.g. for the optional connection to a pure water unit, oil separation aggregate or cascade.

E **2-way ball valve** for filling.

F **Supply bottom scouring** for the optional scouring of deposits of sediments on the bottom of the tank.

G **Mains connection**

H **Interface** level switch and heating control.

I **Interface** ultrasound control.

K **Interface** malfunction indication ultrasound; transmitter actual temperature.

4.6 Tank elements

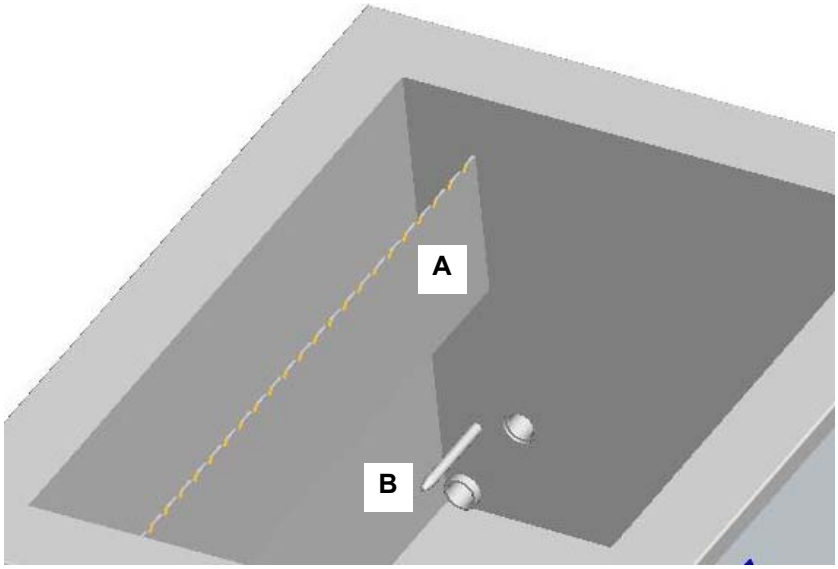

Illustration 3.3 View elements tank inside (left side)

A **Overflow for surface skimming**
upper edge indicates optimum filling level.

B **Tube for temperature gauge (PT100)** for the measuring of the temperature of the liquid.

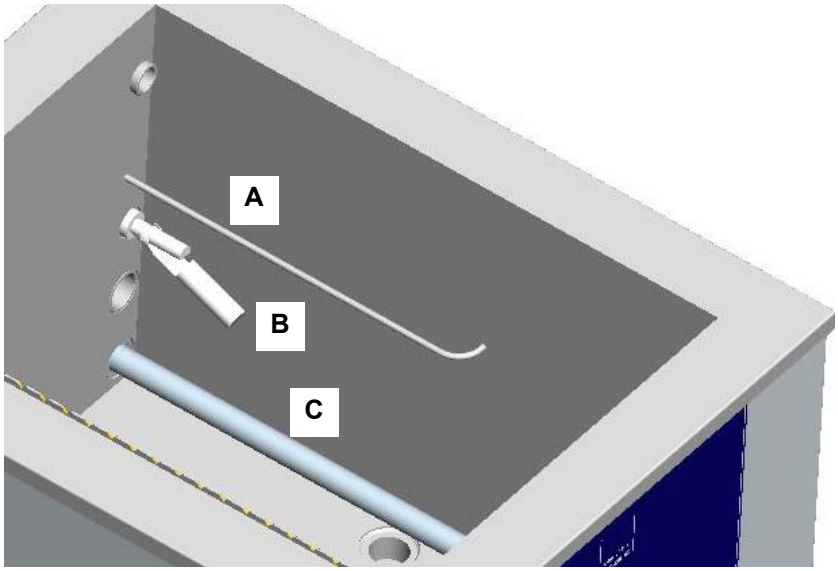

Illustration 3.4 View elements tank inside (right side)

A **Protective bow for heating and level switch**.

B **Level switch** (stainless steel).

C **Heating** (high-performance heating element).

5 Initial operation

Check for transport damages

Check the Elmasonic X-tra for possible transport damages before initial operation.

In case of visible damage do not connect the unit to the mains. Contact your supplier and forwarding agent.

Placement

For operation, place the unit on a dry and solid surface. Ensure that the workplace is sufficiently ventilated!

CAUTION

Risk of electrocution due to humidity inside the unit!
Protect the unit from entering humidity.

The unit inside is splashwater-proof. Keep workplace and housing dry in order to prevent electrical accidents and damages on the unit.

Ambient conditions

- Allowed ambient temperature during operation: +5°C - +40°C
- Allowed relative humidity of air during operation: 80%
- No condensation
- Ensure sufficient ventilation
- In-door operation only

Connect the unit to the mains

The unit must be connected to a grounded shockproof socket only. Ensure that the values indicated on the nameplate of the unit must correspond with the available connecting conditions.

5.1 Connect the unit to the mains

Required mains conditions

Elmasonic X-tra 250:
1 phase (230 or 115V); 1 neutral conductor; 1 PE protective earth

Elmasonic X-tra 550 – 1600:
3 phases (400V or 208V)
1 neutral conductor
1 PE protective earth

Connect mains cable

Use the plug-in mains cable delivered with the unit. Connect the unit to a grounded shockproof socket only. Ensure that the values indicated on the nameplate of the unit must correspond with the available connecting conditions.

6 Putting into operation

6.1 Filling of the unit with cleaning liquid

Shut the drain

Shut the drain duct before filling the tank.

Observe filling level

Fill the cleaning tank with a sufficient quantity of a suitable cleaning liquid before switch-on.

The optimum filling level is indicated by the upper edge of the overflow.

If the level of the cleaning liquid is reduced below a certain level, the level switch automatically switches off the unit.

This prevents the unit from running dry which might cause damage to the material.

Suitable cleaning media

Ensure that the chosen cleaning chemical is suitable for treatment in an ultrasonic bath and observe the instructions on dosage and the compatibility of the material.
We recommend the use of the cleaning media listed in section 8.3.

Prohibited cleaning media

Flammable products are generally not allowed for use in an ultrasonic bath. Observe the safety warnings given in section 8 (Cleaning media).

CAUTION

Risk of fire and explosion!

Never use flammable liquids, or solvents, directly in an ultrasonic cleaning bath.

Use the cleaning media listed in section 8.3.

Ultrasonic activity increases the vapourization of liquids and creates a very fine mist which can catch fire on any ignition source.
Observe the instructions on limitations of use given in section 8.1.

NOTE

Risk of damage to the transducer tank!

Do not use any acid cleaning chemicals (pH value < 7) directly in the stainless-steel tank if the cleaning items or the contamination of the cleaning items contain halogenides (fluorides, chlorides or bromides).
The same applies to NaCl solutions.

Use the cleaning media listed in section 8.3.

The stainless-steel tank can be destroyed by crevice corrosion in a very short time. Substances that cause crevice corrosion can be contained in household cleaners.

Observe the instructions on the limitations of use given in section 8.2.

For queries please contact the manufacturer or your supplier.

Degassing of liquid

Freshly mixed cleaning liquids are saturated with air which lessens the cleaning effect of the ultrasonic activity. By sounding the liquid over a period of several minutes before the cleaning process the tiny air bubbles in the liquid are eliminated.
For queries please contact the manufacturer or your supplier.

7 Ultrasonic cleaning process

7.1 Heating of the cleaning liquid

Depending on the degree and kind of contamination and on the cleaning medium used it might be required to heat up the cleaning liquid. For a quick heating-up process and in order to prevent unnecessary energy losses we recommend to use a cover (optional accessory equipment).

CAUTION

High temperatures! Risk of burning and scalding!

Cleaning bath, transducer tank, housing, cover, basket and cleaning items can heat up considerably.

Do not reach inside the bath. If necessary wear protective gloves when touching unit and basket!

Switch "heating“ to position "on“

Switch on the heating to activate the heating process.

Temperature control at thermostat

Select the required cleaning temperature.
As long as the set temperature is above the actual temperature of the cleaning liquid the heating remains switched on. The yellow pilot lamp "heating" is on and indicates the heating process.

In order to obtain an equally heated cleaning liquid it is necessary to switch on the ultrasound or to stir the liquid from time to time.

Without revolution of the liquid the created heat will only rise to the surface. This would create big temperature differences in the cleaning tank.

7.2 Placement of cleaning items

Caution! The ultrasonic bath has been designed for the ultrasonic treatment of items and liquids only. Do not clean living beings or plants!

No cleaning items on the tank bottom

Do not place the cleaning items directly onto the bottom of the transducer tank, as this might lead to damages on the unit.

Use cleaning basket

Place the cleaning items into the stainless-steel cleaning basket (optional accessory equipment for each unit; included in the delivery of cleaning lines and of units with oscillation device).

Acid-resistant tank

For the use of cleaning chemicals which might destroy or damage the stainless-steel tank use a separate container. For the special plastic tank for acid chemicals please contact your supplier.

7.3 Starting of the cleaning process

Please observe the following instructions before starting the ultrasonic cleaning process.

CAUTION

Risk of scalding by hot surfaces and cleaning liquid!

Ultrasonic energy is physically transformed into heat.

The unit and the liquid in the tank heat up during ultrasonic operation even with the heating switched off.
During permanent operation with cover temperatures exceeding 60°C can be reached.

In permanent operating mode with cover and heating the temperatures can exceed 80°C.

Do not reach inside the bath. If necessary touch unit and basket with protecting gloves!

NOTE

Ultrasonic units can produce annoying sounds.

Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover. This is particularly recommendable for 25 kHz operation without cover.

NOTE

Sensitive surfaces can be damaged when exposed to ultrasound over prolonged periods, particularly at low cleaning frequencies.

Ensure that sensitive surfaces are exposed to ultrasonic activity for a suitable period only.

If in doubt check the cleaning progress regularly and observe the state of the surface material.

NOTE

Ultrasonic energy is physically transformed into heat.

The unit and the cleaning liquid in the tank heat up during ultrasonic operation even with the heating switched off. During permanent operation with cover temperatures exceeding 60°C can be reached.

For the cleaning of temperature-sensitive items please take into consideration that the cleaning liquid heats up.

Select the cleaning frequency

Select the cleaning frequency which is most suitable for the cleaning task at hand:
For coarse and pre-cleaning tasks we recommend the lower frequency. For the fine cleaning and for sensitive surfaces we recommend the higher frequency.

Power regulation

Select the correct power depending on the required cleaning intensity and the kind of surface material.

Sweep

Switch on the Sweep function for an improved sound field distribution. This is particularly recommendable for large-size cleaning items.

Switch on timer

Set the required cleaning period at the timer. Timer operating mode or permanent operating mode.

Timer operating mode

For short-term operation set the timer to timer operating mode (1-15 min). The unit starts the ultrasonic cleaning process and automatically switches off the ultrasound after the set period. This process can be repeated as often as necessary.

Permanent operating mode

For longer cleaning cycles turn the timer to the left into the permanent operating mode position (∞). In the permanent operating mode there is no automatic switch-off. The ultrasound must be switched off by hand (position "off").

7.4 After the cleaning

Follow-up treatment of cleaning items

When the cleaning process is finished rinse the cleaning items under the tap and wipe dry or dry them in a dryer. When working with manual modular cleaning lines it may be necessary to load the tanks for rinsing and drying.

Empty the unit

Drain the liquid as soon as it is dirty or if the unit has not been operated over a prolonged period of time. Certain residues and types of contamination may destroy or damage the stainless-steel tank.

Use the quick-drain duct to empty the cleaning tank.

8 Cleaning media

When choosing the cleaning chemicals ensure that the product is suitable for use in an ultrasonic bath; products that are not suitable can cause damage to the transducer tank and injure the operating staff.

8.1 Limitations concerning cleaners that contain solvents

Caution! Never use flammable liquids, or solvents, directly in an ultrasonic cleaning tank. Risk of fire and explosion!

Observe also the the safety warnings in section 6.

Ultrasound increases the volume of vapourization of liquids and creates a very fine mist that can catch fire on any ignition source at any time.

Do not fill potentially explosive substances and flammable solvents

- of the classes of hazard according to the Ordinance Regulating Flammable Liquids: AI, B, AII, AIII
- or marked in compliance with the EEC directives by symbols and safety warnings E or R1, R 2
- or R 3 for potentially explosive substances
- or F+, F or R 10, R 11 or R 12 for flammable substances

into the stainless-steel tank for ultrasonic treatment.

Exception In compliance with the general regulations on the protection of labour, certain limited volumes of flammable liquids (max. 1 litre) can be used in an ultrasonic cleaning unit, under the following conditions:

These liquids must be filled into a suitable separate vessel (e.g. beaker) with sufficient ventilation; this vessel can then be put into the stainless-steel tank which is filled with non-flammable liquid (water with a few drops of interlacing agent).

In case of queries please contact the manufacturer or supplier.

8.2 Limitations concerning aqueous cleaners

Do not use aqueous cleaning media with pH values in the acid range (pH < 7) directly in the ultrasonic tank if fluoride (F), chloride (Cl) or bromide (Br) ions can be taken in by the removed dirt or through the cleaning chemical. These can destroy the stainless-steel tank through crevice corrosion within a very short period of ultrasonic operation.

Acids and alkaline solutions

Other media which can destroy the stainless-steel tank when used in high concentrations or with high temperatures during ultrasonic operation are: nitric acid, sulphuric acid, formic acid, hydrofluoric acid (even diluted). (Completeness of list not guaranteed.)

Potassium hydroxide

Potassium hydroxide solution can cause stress corrosion cracking of the ultrasonic tank.

Examples:

- treatment with hydrochloric acid or hydrofluoric acid, or salts of acid solutions
- removal of fluoride, chloride or tetrafluoroborate-containing fluxing agents from soldered metal items or electronic components
- decalcifying of medical systems which are contaminated with physiological salt solution in solution containing citric acid
- ultrasound-assisted rinsing of items which have been etched with hydrofluoric acid or ammonium bifluoride.

Entrainment of chemical substances

The above limitations for the use of chemicals in an ultrasonic bath also apply for the entering of the mentioned chemicals into the aqueous (particularly distilled water) bath through entrainment or from the removed dirt.

Acid-resistant tank

For the ultrasonic treatment with the above mentioned media use an acid-resistant tank. Please contact your supplier for the available equipment.

Disinfectants

The limitations of use also apply to the standard cleaners and disinfectants if these contain the above mentioned compounds.

Safety regulations

Observe the safety warnings indicated by the manufacturer of the chemicals (e.g. goggles, gloves, R and S phrases).

Exclusion of liability

The manufacturer cannot be held liable for any damages caused by non-observance of the limitations mentioned in section 8.1 and 8.2!

8.3 List of recommended cleaning media

Elma has a large range of suitable cleaning products on offer which have been developed by chemical engineers in the Elma laboratory. Please contact your supplier to find the most suitable cleaning chemical for your application.

Environment-friendly products

The organic detergents contained in the Elma clean products are biodegradable. Product information and safety data sheets are available from the manufacturer.

9 Maintenance

9.1 Maintenance / Care

Caution! Pull the mains plug before carrying out any maintenance works!

Electrical securtiy

The present Elmasonic X-tra ultrasonic cleaning unit is maintenance-free.
Check the housing and the mains cable regularly for damage in order to prevent electrical accidents.

Care of transducer tank

Lime deposits on the stainless-steel tank can be cleaned gently e.g. with elma clean 40 or elma clean 115C (operate the unit with concentrate + water).

Grid of air fan

Check regularly the grid of the air fan at the bottom of the unit (not existent in all units). Remove dirt if necessary to allow sufficient ventilation inside the unit.

Care of housing

Residues of cleaning media can be wiped away with a household cleaner or decalcifier depending on the kind of contamination. **Do not put the unit under water!**

Disinfection

If the unit is used for medical and sanitary purposes it is necessary to disinfect the transducer tank regularly (standard surface disinfectants).

9.2 Service life of the transducer tank

The transducer tank and particularly the sound-giving surfaces are wear parts. The changes on the surfaces that occur after a certain operating period are visible first as grey areas and later on as material abrasions, the so-called cavitation erosion.

The Elma units are made of a highly cavitation-proof special steel. To prolong the service life of your ultrasonic unit even more we recommend to observe the following instructions:

- Regularly remove any cleaning residues, in particular metal particles and rust films.
- Use suitable cleaning chemicals, with particular caution concerning the kind of removed contamination (see instructions section 8.2).
- Exchange the cleaning medium before it is too heavily contaminated.
- Do not operate the ultrasound unnecessarily; switch off after the cleaning process.
- Limit 25 kHz operation to the required minimum, operate the higher frequency when possible.

9.3 Repair

Opening by authorized specialized personnel only

Repair and maintenance works which require the unit to be connected and opened must be carried out by authorized and specialized personnel only.

CAUTION

Risk of electrocution due to live parts inside the unit!

Pull the mains plug before opening the unit!

The manufacturer cannot be held liable for any damage caused by unauthorized maintenance or repair works on the unit.

In case of a break-down of the unit please contact the manufacturer or your supplier.

10 Technical details

	X-tra 250	X-tra 550	X-tra 800	X-tra 1200	X-tra 1600
Max. tank filling volume (litre)	28.8	67.0	85.7	130.0	185.0
Tank service volume (litre)	18.3	45.8	68.3	94.0	145.0
Tank dimensions W x D x H (mm)	372 x 330 x 235	377 x 500 x 355	377 x 500 x 505	600 x 600 x 360	600 x 600 x 515
Tank service dimensions W x D x H (mm)	300 x 330 x 185	300 x 500 x 305	300 x 500 x 455	505 x 600 x 310	520 x 600 x 465
Total unit dimensions W x D x H (mm)	497 x 600 x 555	497 x 770 x 555	497 x 770 x 705	720 x 895 x 555	720 x 895 x 705
Housing dimensions W x D x H (mm)	497 x 450 x 555	497 x 621 x 555	497 x 621 x 705	720 x 720 x 555	720 x 720 x 705
Tank / housing material	stainless steel	stainless steel	stainless steel	stainless steel	stainless steel
Drain duct (inch)	1“ 2-way	1“ 2-way	1“ 2-way	1 1/4“ 2-way	1 1/4“ 2-way
Weight approx. (kg)	23	35	45	100	120
Basket inner dimensions W x D x H (mm)	290 x 260 x 140	255 x 460 x 208	255 x 460 x 288	440 x 540 x 210	440 x 540 x 335
Mesh size of basket (mm)	9 x 1	9 x 1	9 x 1	9 x 1	11 x 1,6
Maximum basket charge weight (kg)	approx. 10	approx. 10	approx. 10	approx. 20	approx. 20
Mains voltage (Vac)	115 / 230	400 / 208	400 / 208	400 / 208	400 / 208
Mains frequency (Hz)	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60
Mains connections	1 phase; 1N; 1 PE	3 phases; 1N; 1 PE	3 phases; 1N; 1 PE	3 phases; 1N; 1 PE	3 phases; 1N; 1 PE
Power consumption total (W)	1300	3600	4900	7400	7600

	X-tra 250	X-tra 550	X-tra 800	X-tra 1200	X-tra 1600
Ultrasonic frequency (kHz) switch-over	25/45 35/130	25/45 35/130	25/45 35/130	25/45 35/130	25/45 35/130
Ultrasonic power RMS (W)	300	600	900	1400	1600
Ultrasonic peak power max. (W)*	1200	2400	3600	5600	6400
Heating power (W)	1000	3000	4000	6000	6000
Regulating range thermostat	20-80°C	20-80°C	20-80°C	20-80°C	20-80°C
Sweep function	✓	✓	✓	✓	✓
Ultrasound power control	✓	✓	✓	✓	✓
Timer 15 min / permanent operation	✓	✓	✓	✓	✓

* The signal form of the wave results in a factor 4 for the ultrasonic peak max.

11 Putting out of action and waste disposal

The unit can be taken to metal and electronics recycling stations or returned to the manufacturer.

12 Manufacturer's contact address

Please visit our homepage. You will find helpful information and descriptions on our large product range:

Do you have any queries or suggestions concerning the present unit, its operation or the Operating Instructions?
Please contact us, we will be glad to assist:

Technical Support

Subject to technical and visual modifications. Elma_ch_1105